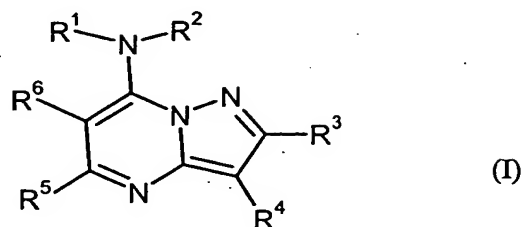


Claims

1. A pyrazolopyrimidine of the formula



in which

5  $R^1$  represents hydrogen, optionally substituted alkyl, optionally substituted alkenyl, optionally substituted alkynyl, optionally substituted cycloalkyl or represents optionally substituted heterocyclyl,

$R^2$  represents hydrogen or alkyl, or

10  $R^1$  and  $R^2$  together with the nitrogen atom to which they are attached represent an optionally substituted heterocyclic ring,

$R^3$  represents hydrogen, halogen, optionally substituted alkyl or optionally substituted cycloalkyl,

$R^4$  represents a radical of the formula  $\begin{array}{c} \text{---C=X} \\ | \\ \text{NH}_2 \end{array}$ , in which

X represents an oxygen atom, an HN group, an HO-N group or Z-O-N=, in which

15 Z represents optionally substituted alkyl or aralkyl,

or

$R^4$  represents a radical of the formula  $\begin{array}{c} \text{---C=N-R}^8 \\ | \\ \text{R}^7 \end{array}$ , in which

$R^7$  represents hydrogen or alkyl and

20  $R^8$  represents optionally substituted alkyl, optionally substituted alkyl, optionally substituted phenyl or represents optionally substituted phenylamino,

R<sup>5</sup> represents halogen, optionally substituted alkylthio, optionally substituted alkylsulfinyl or represents optionally substituted alkylsulfonyl,

R<sup>6</sup> represents optionally substituted aryl.

2. The pyrazolopyrimidine of the formula (I) as claimed in claim 1 in which

5 R<sup>1</sup> represents hydrogen, alkyl having 1 to 6 carbon atoms which may be mono- to penta-substituted by identical or different substituents from the group consisting of halogen, cyano, hydroxyl, alkoxy having 1 to 4 carbon atoms and cycloalkyl having 3 to 6 carbon atoms,

10 R<sup>1</sup> represents alkenyl having 2 to 6 carbon atoms which may be mono- to trisubstituted by identical or different substituents from the group consisting of halogen, cyano, hydroxyl, alkoxy having 1 to 4 carbon atoms and cycloalkyl having 3 to 6 carbon atoms, or

15 R<sup>1</sup> represents alkynyl having 3 to 6 carbon atoms which may be mono- to trisubstituted by identical or different substituents from the group consisting of halogen, cyano, alkoxy having 1 to 4 carbon atoms and cycloalkyl having 3 to 6 carbon atoms, or

R<sup>1</sup> represents cycloalkyl having 3 to 6 carbon atoms which may be mono- to trisubstituted by identical or different substituents from the group consisting of halogen and alkyl having 1 to 4 carbon atoms, or

20 R<sup>1</sup> represents saturated or unsaturated heterocyclyl having 5 or 6 ring members and 1 to 3 hetero atoms, such as nitrogen, oxygen and/or sulfur, where the heterocyclyl may be mono- or disubstituted by halogen, alkyl having 1 to 4 carbon atoms, cyano, nitro and/or cycloalkyl having 3 to 6 carbon atoms,

R<sup>2</sup> represents hydrogen or alkyl having 1 to 4 carbon atoms, or

25 R<sup>1</sup> and R<sup>2</sup> together with the nitrogen atom to which they are attached represent a saturated or unsaturated heterocyclic ring having 3 to 6 ring members, where the heterocycle may contain a further nitrogen, oxygen or sulfur atom as ring member and where the heterocycle may be substituted up to three times by fluorine, chlorine, bromine, alkyl having 1 to 4 carbon atoms and/or haloalkyl having 1 to 4  
30 carbon atoms and 1 to 9 fluorine and/or chlorine atoms,

$R^3$  represents hydrogen, fluorine, chlorine, bromine, iodine, alkyl having 1 to 4 carbon atoms, haloalkyl having 1 to 4 carbon atoms and 1 to 9 halogen atoms or represents cycloalkyl having 3 to 6 carbon atoms,

$R^4$  represents a radical of the formula  $\begin{array}{c} \text{---C=X} \\ | \\ \text{NH}_2 \end{array}$ , in which

5             $X$  represents an oxygen atom, an HN group or an HO-N group,

or

$R^4$  represents a radical of the formula  $\begin{array}{c} \text{---C=N---R}^8 \\ | \\ \text{R}^7 \end{array}$ , in which

$R^7$  represents hydrogen or alkyl having 1 to 4 carbon atoms and

10             $R^8$  represents hydroxyl, alkyl having 1 to 4 carbon atoms, where each of the alkyl radicals may be mono- or disubstituted by alkoxy having 1 to 4 carbon atoms, alkylcarbonyl having 1 to 3 carbon atoms in the alkyl moiety and/or alkoxy carbonyl having 1 to 3 carbon atoms in the alkoxy moiety, or

15             $R^8$  represents phenyl which may be mono- to trisubstituted by identical or different substituents from the group consisting of alkyl having 1 to 4 carbon atoms, alkoxy having 1 to 4 carbon atoms, halogen, nitro and haloalkyl having 1 to 4 carbon atoms and 1 to 5 halogen atoms, or

20             $R^8$  represents phenylamino which may be mono- to trisubstituted by identical or different substituents from the group consisting of alkyl having 1 to 4 carbon atoms, alkoxy having 1 to 4 carbon atoms, halogen, nitro and haloalkyl having 1 to 4 carbon atoms and 1 to 5 halogen atoms,

$R^5$  represents fluorine, chlorine, bromine, alkoxy having 1 to 4 carbon atoms, alkylthio having 1 to 4 carbon atoms, alkylsulfinyl having 1 to 4 carbon atoms or alkylsulfonyl having 1 to 4 carbon atoms, and

25             $R^6$  represents phenyl which may be mono- to tetrasubstituted by identical or different substituents from the group consisting of halogen, cyano, nitro, amino, hydroxyl, formyl, carboxyl, carbamoyl, thiocarbamoyl;

in each case straight-chain or branched alkyl, alkoxy, alkylthio, alkylsulfinyl or alkylsulfonyl having in each case 1 to 6 carbon atoms;

in each case straight-chain or branched alkenyl or alkenyloxy having in each case 2 to 6 carbon atoms;

5 in each case straight-chain or branched haloalkyl, haloalkoxy, haloalkylthio, haloalkylsulfinyl or haloalkylsulfonyl having in each case 1 to 6 carbon atoms and 1 to 13 identical or different halogen atoms;

in each case straight-chain or branched haloalkenyl or haloalkenyloxy having in each case 2 to 6 carbon atoms and 1 to 11 identical or different halogen atoms;

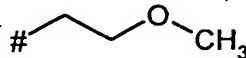
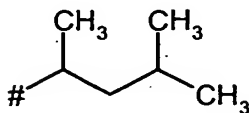
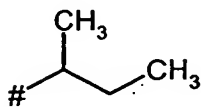
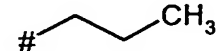
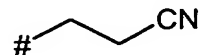
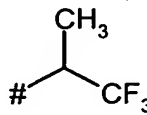
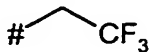
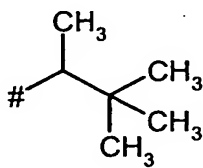
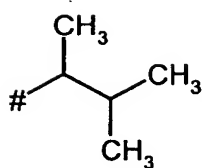
10 in each case straight-chain or branched alkylamino, dialkylamino, alkylcarbonyl, alkylcarbonyloxy, alkoxy carbonyl, alkylsulfonyloxy, hydroximinoalkyl or alkoximinoalkyl having in each case 1 to 6 carbon atoms in the individual alkyl moieties;

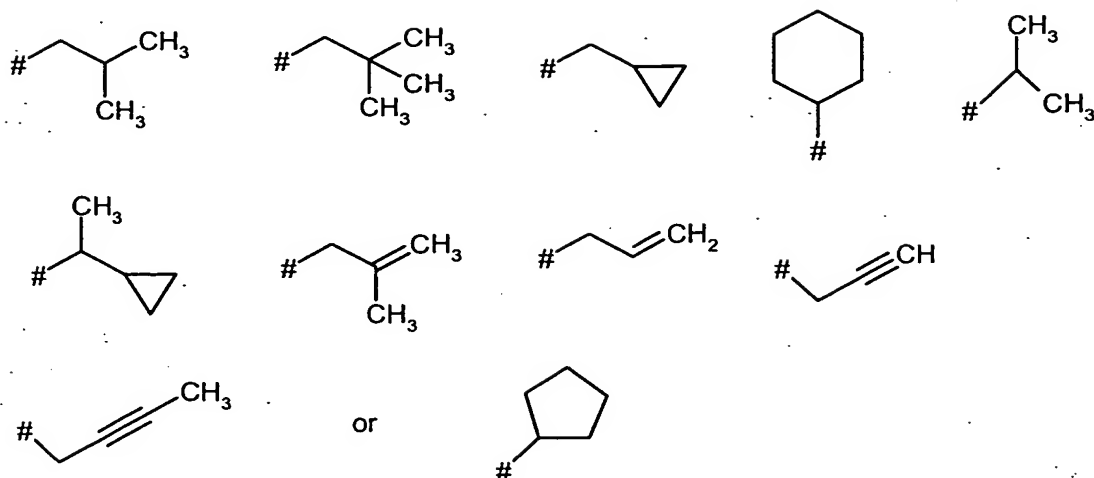
cycloalkyl having 3 to 6 carbon atoms,

15 2,3-attached 1,3-propanediyl, 1,4-butanediyl, methylenedioxy (-O-CH<sub>2</sub>-O) or 1,2-ethylenedioxy (-O-CH<sub>2</sub>-CH<sub>2</sub>-O-), where the radicals may be mono- or polysubstituted by identical or different substituents from the group consisting of halogen, alkyl having 1 to 4 carbon atoms and haloalkyl having 1 to 4 carbon atoms and 1 to 9 identical or different halogen atoms.

20 3. The pyrazolopyrimidine of the formula (I) as claimed in claim 1 or 2 in which

R<sup>1</sup> represents hydrogen or a radical of the formula





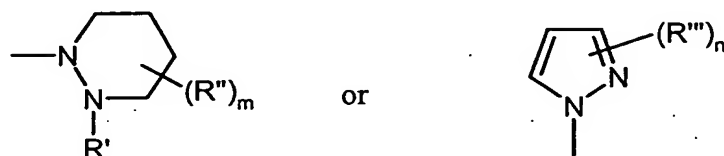
where # denotes the point of attachment,

$R^2$  represents hydrogen, methyl, ethyl or propyl, or

5  $R^1$  and  $R^2$  together with the nitrogen atom to which they are attached represent pyrrolidinyl, piperidinyl, morpholinyl, thiomorpholinyl, piperazinyl, 3,6-dihydro-1(2H)-piperidinyl or tetrahydro-1(2H)-pyridazinyl, where these radicals may be substituted by 1 to 3 fluorine atoms, 1 to 3 methyl groups and/or trifluoromethyl,

or

10  $R^1$  and  $R^2$  together with the nitrogen atom to which they are attached represent a radical of the formula



in which

$R'$  represents hydrogen or methyl,

15  $R''$  represents methyl, ethyl, fluorine, chlorine or trifluoromethyl,

$m$  represents the number 0, 1, 2 or 3, where  $R''$  represents identical or different radicals if  $m$  represents 2 or 3,

R<sup>4</sup> represents methyl, ethyl, fluorine, chlorine or trifluoromethyl

and

n represents the number 0, 1, 2 or 3, where R<sup>4</sup> represents identical or different radicals if n represents 2 or 3,

5 R<sup>3</sup> represents hydrogen, fluorine, chlorine, bromine, iodine, methyl, ethyl, isopropyl, cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, trifluoromethyl, 1-trifluoromethyl-2,2,2-trifluoroethyl or heptafluoroisopropyl,

R<sup>4</sup> represents a radical of the formula  $\begin{array}{c} \text{---C=X, in which} \\ | \\ \text{NH}_2 \end{array}$

X represents an oxygen atom, a sulfur atom, an HN or an HO-N group, or

10 R<sup>4</sup> represents a radical of the formula  $\begin{array}{c} \text{---C=N---R}^8, \text{ in which} \\ | \\ \text{R}^7 \end{array}$

R<sup>7</sup> represents hydrogen, methyl or ethyl and

R<sup>8</sup> represents alkyl having 1 or 2 carbon atoms, where each of these alkyl radicals may be substituted by methoxy, ethoxy, methylcarbonyl, ethylcarbonyl, methoxycarbonyl or ethoxycarbonyl, or

15 R<sup>8</sup> represents phenyl which may be mono- to trisubstituted by identical or different substituents from the group consisting of methyl, ethyl, methoxy, ethoxy, fluorine, chlorine, bromine, nitro and trifluoromethyl, or

R<sup>8</sup> represents phenylamino which may be mono- to trisubstituted by identical or different substituents from the group consisting of methyl, ethyl, methoxy, ethoxy, 20 fluorine, chlorine, bromine, nitro and trifluoromethyl,

R<sup>5</sup> represents fluorine, chlorine, bromine, methoxy, ethoxy, methylthio, methylsulfinyl or methylsulfonyl, and

R<sup>6</sup> represents phenyl which may be mono- to trisubstituted by identical or different substituents from the group consisting of fluorine, chlorine, bromine, cyano, nitro, 25 formyl, methyl, ethyl, n- or i-propyl, n-, i-, s- or t-butyl, allyl, propargyl, methoxy, ethoxy, n- or i-propoxy, methylthio, ethylthio, n- or i-propylthio, methylsulfinyl,

5 ethylsulfinyl, methylsulfonyl, ethylsulfonyl, allyloxy, propargyloxy, trifluoro-  
methyl, trifluoroethyl, difluoromethoxy, trifluoromethoxy, difluorochloromethoxy,  
trifluoroethoxy, difluoromethylthio, difluorochloromethylthio, trifluoromethylthio,  
trifluoromethylsulfinyl, trifluoromethylsulfonyl, trichloroethynyloxy, trifluoro-  
ethynyloxy, chloroallyloxy, iodopropargyloxy, methylamino, ethylamino, n- or  
i-propylamino, dimethylamino, diethylamino, acetyl, propionyl, acetyloxy,  
methoxycarbonyl, ethoxycarbonyl, hydroximinomethyl, hydroximinoethyl,  
methoximinomethyl, ethoximinomethyl, methoximinoethyl, ethoximinoethyl,  
cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl,

10 2,3-attached 1,3-propanediyl, methylenedioxy (-O-CH<sub>2</sub>-O-) or 1,2-ethylenedioxy  
(-O-CH<sub>2</sub>-CH<sub>2</sub>-O-), where these radicals may be mono- or polysubstituted by  
identical or different substituents from the group consisting of fluorine, chlorine,  
methyl, ethyl, n-propyl, i-propyl and trifluoromethyl.

15 4. The pyrazolopyrimidine of the formula (I) as claimed in one or more of claims 1 to 3 in  
which

R<sup>5</sup> represents fluorine, chlorine, bromine, methoxy or methylthio and

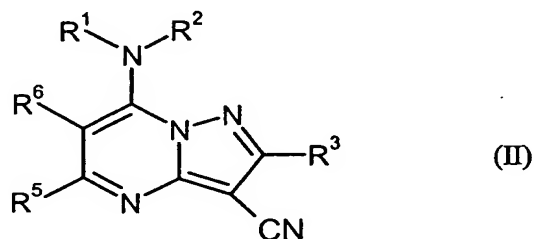
R<sup>6</sup> represents 2,4-, 2,5- or 2,6-disubstituted phenyl or 2-substituted phenyl or  
represents 2,4,6-trisubstituted phenyl, where the substituents are selected from the  
group

20 fluorine, chlorine, bromine, cyano, nitro, formyl, methyl, ethyl, n- or i-propyl, n-,  
i-, s- or t-butyl, allyl, propargyl, methoxy, ethoxy, n- or i-propoxy, methylthio,  
ethylthio, n- or i-propylthio, methylsulfinyl, ethylsulfinyl, methylsulfonyl,  
ethylsulfonyl, allyloxy, propargyloxy, trifluoromethyl, trifluoroethyl,  
difluoromethoxy, trifluoromethoxy, difluorochloromethoxy, trifluoroethoxy,  
25 difluoromethylthio, difluorochloromethylthio, trifluoromethylthio, trifluoro-  
methylsulfinyl, trifluoromethylsulfonyl, trichloroethynyloxy, trifluoroethynyloxy,  
chloroallyloxy, iodopropargyloxy, methylamino, ethylamino, n- or i-propylamino,  
dimethylamino, diethylamino, acetyl, propionyl, acetyloxy, methoxycarbonyl,  
ethoxycarbonyl, hydroximinomethyl, hydroximinoethyl, methoximinomethyl,  
30 ethoximinomethyl, methoximinoethyl, ethoximinoethyl, cyclopropyl, cyclobutyl,  
cyclopentyl or cyclohexyl,

2,3-attached 1,3-propanediyl, methylenedioxy (-O-CH<sub>2</sub>-O-) or 1,2-ethylenedioxy (-O-CH<sub>2</sub>-CH<sub>2</sub>-O-), where these radicals may be mono- or polysubstituted by identical or different substituents from the group consisting of fluorine, chlorine, methyl, ethyl, n-propyl, i-propyl and trifluoromethyl.

5. A process for preparing pyrazolopyrimidines of the formula (I) as claimed in one or more of claims 1 to 4, characterized in that

a) cyano compounds of the formula



in which

10 R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup>, R<sup>5</sup> and R<sup>6</sup> are as defined above

are either

α) reacted with acids and water, if appropriate in the presence of a diluent,

or

β) reacted with hydroxylamine or a hydroxylammonium salt in the presence  
15 of a diluent and, if appropriate, in the presence of a catalyst,

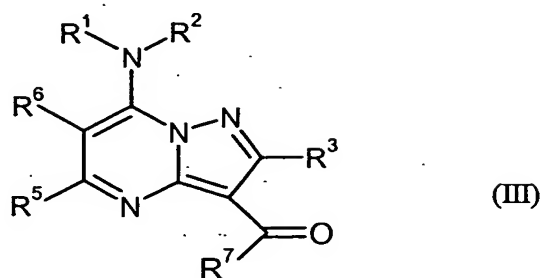
or

γ) reacted with ammonium chloride in the presence of a base and in the  
presence of a diluent,

or



b) carbonyl compounds of the formula



in which

$R^1, R^2, R^3, R^5, R^6$  and  $R^7$  are as defined above

5 are reacted with amino compounds of the formula



in which

$R^8$  is as defined above,

10 in the presence of a diluent and, if appropriate, in the presence of a catalyst, where the amino compounds of the formula (IV) may also be employed in the form of their acid addition salts.

6. A composition for controlling unwanted microorganisms, characterized in that it comprises at least one pyrazolopyrimidine of the formula (I) according to one or more of claims 1 to 4, in addition to extenders and/or surfactants.
- 15 7. The composition as claimed in claim 6, comprising at least one further fungicidally or insecticidally active compound.
8. The use of pyrazolopyrimidines of the formula (I) according to one or more of claims 1 to 4 for controlling unwanted microorganisms.
9. A method for controlling unwanted microorganisms, characterized in that pyrazolopyrimidines of the formula (I) according to one or more of claims 1 to 4 are applied to the  
20 unwanted microorganisms and/or their habitat.

10. A process for preparing compositions for controlling unwanted microorganisms, characterized in that pyrazolopyrimidines of the formula (I) according to one or more of claims 1 to 4 are mixed with extenders and/or surfactants.